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The Calculation of Side Radiation from a Detailed Atomic Physics 2D Radiation Transport Simulation

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Calculations in 1D have shown that divertor plate ablation, following an ITER-scale disruption, is mitigated via shielding of the plate by the ablated vapor. The incoming energy is absorbed in the vapor and the majority of the energy appears as radiation which is preferentially emitted back towards the core. These earlier calculations can not address the role of emission out the sides of the ablating plasma. Our 2D simulations allow the calculation of side radiation and, in particular, the radiation flux incident on nearby structures. The ancillary ablated material from these structures can be comparable to the material ablated from the strike plate. We discuss the effect of side radiation for two divertor designs. The 2D plasma profiles of temperature and density are obtained from the FOREV code and are used in a non-LTE, non-local radiation transport code to give a detailed calculation of the side radiation. The important role of line emission is accounted for using an efficient complete linearization algorithm. Results of these 2D calculations will aid in deciding the optimum divertor design for ITER.

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